

### **REMARKS**

The Office Action of November 28, 2008 has been reviewed and the Examiner's comments carefully considered. Claims 1 and 3 have been amended and claims 2, 4 and 5 have been cancelled by way of this Amendment. Accordingly, claims 1, 3 and 6-9 are currently pending in this application with claim 1 being in independent form. Support for the amendments can be found in Fig. 2b, at page 8, lines 6-17 of the specification, and in original claims 1-9. Applicants respectfully submit that no new matter has been added by way of this Amendment.

#### **Prior Art Rejections:**

Claims 1 and 6-9 stand rejected under 35 U.S.C. §102(b) for anticipation by U.S. Patent No. 4,094,666 to Ototani (hereinafter "Ototani '666"). Claim 2 stands rejected under 35 U.S.C. §103(a) for obviousness over Ototani '666. Claims 3-5 stand rejected under 35 U.S.C. §103(a) for obviousness over Ototani '666 in view of U.S. Patent No. 4,832,742 to Ototani (hereinafter "Ototani '742"). In view of the foregoing amendments and following remarks, reconsideration and withdrawal of these rejections are respectfully requested.

The present invention, as defined by amended claim 1, is directed to a cored wire injection process for introducing fluxes and alloying additives in a liquid steel bath after adjusting bath temperature to approximately 1630°C and the chemistry of liquid steel in a secondary treatment unit, a ladle of the treatment unit having a 3 m liquid column height. The injection process comprising the steps of: releasing the additives very close to the bottom of the ladle at a depth of approximately 3 m by injecting, at a predetermined speed of approximately 110 m/min, a prefabricated cored wire, configured to have dimensions appropriate for maximum utilization of the additives, the dimensions being 18 mm in diameter and 0.8 mm in sheath thickness. These dimensions of the prefabricated cored wire and this predetermined speed of injection being determined depending on the grade of liquid steel, treatment temperature, ladle size, liquid column height, and properties of cored wire material.

Applicants submit that Ototani '666 and Ototani '742, taken separately or combined, fail to teach or suggest all of the claimed limitations of amended claim 1.

With regard to Ototani '666, this reference teaches a process of molten iron and steel refining, which utilizes a clad wire (4) containing refining additives. The wire (4) is fed

into a ladle (5) containing molten metal (6). Ototani '666 does not teach or suggest an injection speed of 110 m/min, cored wire dimensions 18 mm in diameter and 0.8 mm in sheath thickness, a bath temperature of 1630°C, a liquid column height of 3 m, or an additives releasing depth of 3 m, as is claimed.

With regard to Ototani '742, this reference teaches a flexible core wire to be injected into a molten material for providing refining additives to the molten material. Ototani teaches that the overall diameter of the clad wire can be in the range of 8-30 mm and that the sheath thickness can be in the range of 0.3-1.0 mm. Applicants submit that Ototani '742 does not teach or suggest the specific combination of a clad wire having an overall diameter of 18 mm and a sheath thickness of 0.8 mm. Rather, as illustrated by the Examples and by Table 1, Ototani '742 teaches that a clad wire having an overall diameter of 18 mm would have a sheath thickness of approximately 0.6 mm and that a sheath thickness of 0.8 mm would be provided to a clad wire having an overall diameter of approximately 25 mm. Ototani '742 also fails to teach or suggest an injection speed of 110 m/min, a bath temperature of 1630°C, a liquid column height of 3 m, or an additives releasing depth of 3 m, as is claimed. As such, Ototani '742 fails to fairly suggest a modification to the process taught by Ototani '666 that reaches the claimed invention.

Further, with respect to the assertion in the Office Action that the claimed wire injection speed is obvious because the claimed value of 110 m/min falls within the broad range of 20-500 m/min taught by Ototani '666, Applicants respectfully disagree. Such reasoning only applies where the prior art discloses a range encompassing a somewhat narrower claimed range. MPEP §2144.05(I). When the disclosed range is so broad as to encompass a very large number of distinct possibilities, a *prima facie* case of obviousness is not established without further evidence of obviousness and the undertaking of a full obviousness inquiry. *Id.*; MPEP §2144.08. Applicants submit that the range of 20-500 m/min taught by Ototani '666 is much broader than the particular claimed value of 110 m/min and is therefore, by itself, insufficient evidence to establish a *prima facie* case of obviousness for the claimed injection speed.

Moreover, neither Ototani '666 nor Ototani '742 addresses the problem solved by the process set forth in claim 1 to maximize the utilization of additives during the injection process, as noted at page 3, lines 13-27 of the current application. Rather Ototani '666 aims to

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improve the properties of steel and Ototani '742 aims at increasing the flexibility a clad wire. Ototani '666 and Ototani '742 do not teach that the particular injection rate of the core wire is chosen on the basis of the melt temperature, wire size, and liquid column height in order to ensure that the additives within the core wire are released at a depth very close to the bottom of the ladle, as discussed at page 5, line 6 to page 6, line 18 of the current application. As such, the claimed values of bath temperature, liquid column height, wire injection rate, and wire diameter and sheath thickness cannot be considered obvious as optimized parameters of result-effective variables recognized in the prior art. MPEP §2144.05(II).

Applicants submit that independent claim 1 is allowable for at least the foregoing reasons, as the prior art of record, including Ototani '666 and Ototani '742, fails to teach or suggest the claimed subject matter. Applicants respectfully request that the rejection of this claim be withdrawn.

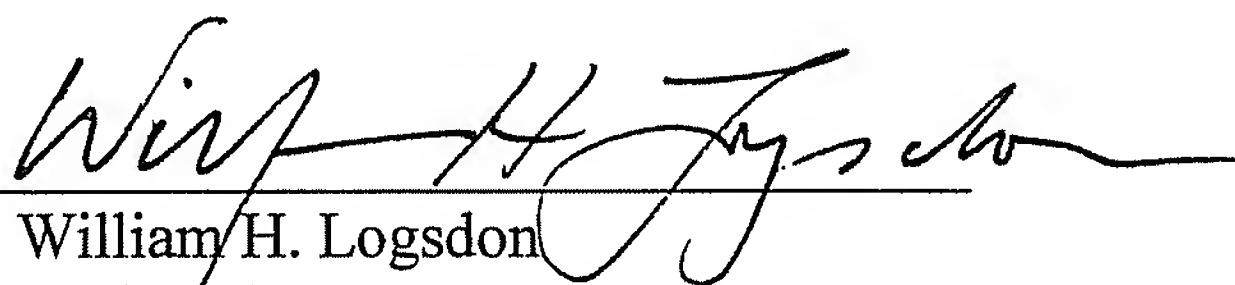
Claims 3 and 6-9 are dependent upon and add further limitations to independent claim 1 and are allowable for at least the same reasons discussed above in connection with claim 1. Applicants respectfully request that the rejections of these claims be withdrawn.

**Conclusion:**

In view of the above amendments and remarks, reconsideration of the rejections and allowance of claims 1, 3 and 6-9 are respectfully requested.

Respectfully submitted,

THE WEBB LAW FIRM

By   
William H. Logsdon  
Registration No. 22,132  
Attorney for Applicants  
436 Seventh Avenue  
700 Koppers Building  
Pittsburgh, PA 15219  
Telephone: (412) 471-8815  
Facsimile: (412) 471-4094  
E-mail: webblaw@webblaw.com